Textbook Alignment to the Utah Core – Physics

*This alignment has been completed using an "Independent Alignment Vendor" from the USOE approved list (**www.schools.utah.gov/curr/imc/indvendor.html**.)   Yes _____   No _____*

Name of Company and Individual Conducting Alignment: _____

A **"Credential Sheet"** has been completed on the above company/evaluator and is (Please check one of the following):

☐ **On record with the USOE.**

☐ **The "Credential Sheet" is attached to this alignment.**

Instructional Materials Evaluation Criteria (name and grade of the core document used to align): Physics Core Curriculum

_____

Title: _____   **ISBN#:** _____

Publisher: _____

Overall percentage of coverage in the *Student Edition (SE) and Teacher Edition (TE)* of the Utah State Core Curriculum: _____%

Overall percentage of coverage in *ancillary material*s of the Utah Core Curriculum: _____%

STANDARD I: **Students will understand hw to measure, calculate, and describe the motion of an object in terms of position, time, velocity, and acceleration.**

Percentage of coverage in the *student and teacher edition* for Standard I: _____ %	Percentage of coverage not in student or teacher edition, but covered in the *ancillary material* for Standard I: _____ %	
OBJECTIVES & INDICATORS	**Coverage in *Student Edition(SE) and Teacher Edition (TE)* (pg #'s, etc.)**	**Coverage in *Ancillary Material* (titles, pg #'s, etc.)**	*Not covered in TE, SE or ancillaries* ✔

Objective 1.1: Describe the motion of an object in terms of position, time, and velocity.				
a.	Calculate the average velocity of a moving object using data obtained from measurements of position of the object at two or more times.			
b.	Distinguish between distance and displacement.			
c.	Distinguish between speed and velocity.			
d.	Determine and compare the average and instantaneous velocity of an object from data showing its position at given times.			
e.	Collect, graph, and interpret data for position vs. time to describe the motion of an object and compare this motion to the motion of another object.			
Objective 1.2: Analyze the motion of an object in terms of velocity, time, and acceleration.				
a.	Determine the average acceleration of an object from data showing velocity at given times.			
b.	Describe the velocity of an object when its acceleration is zero.			
c.	Collect, graph, and interpret data for velocity vs. time to describe the motion of an object.			
d.	Describe the acceleration of an object moving in a circular path at constant speed (i.e., constant speed, but changing direction).			
e.	Analyze the velocity and acceleration of an object over time.			
Objective 1.3: Relate the motion of objects to a frame of reference.				
a.	Compare the motion of an object relative to two frames of reference.			
b.	Predict the motion of an object relative to a different frame of reference (e.g., an object dropped from a moving vehicle observed from the vehicle and by a person standing on the sidewalk).			
c.	Describe how selecting a specific frame of reference can			

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simplify the description of the motion of an object.			
Objective 1.4: Use Newton's first law to explain the motion of an object.			
a. Describe the motion of a moving object on which balanced forces are acting.			
b. Describe the motion of a stationary object on which balanced forces are acting.			
c. Describe the balanced forces acting on a moving object commonly encountered (e.g., forces acting on an automobile moving at constant velocity, forces that maintain a body in an upright position while walking).			
STANDARD II: Students will understand the relation between force, mass, and acceleration.			

Percentage of coverage in the *student and teacher edition* for Standard II:_____ %

Percentage of coverage not in student or teacher edition, but covered in the *ancillary material* for Standard II: _____%

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Objective 2.1: Analyze forces acting on an object.			
a. Observe and describe forces encountered in everyday life (e.g., braking of an automobile-friction, falling rain drops-gravity, directional compass-magnetic, bathroom scale-elastic or spring).			
b. Use vector diagrams to represent the forces acting on an object.			
c. Measure the forces on an object using appropriate tools.			
d. Calculate the net force acting on an object.			
Objective 2.2: Using Newton's second law, relate the force, mass, and acceleration of an object.			
a. Determine the relationship between the net force on an object and the object's acceleration.			
b. Relate the effect of an object's mass to its acceleration when			

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	an unbalanced force is applied.			
c.	Determine the relationship between force, mass, and acceleration from experimental data and compare the results to Newton's second law.			
d.	Predict the combined effect of multiple forces (e.g., friction, gravity, and normal forces) on an object's motion.			
Objective 2.3: Explain that forces act in pairs as described by Newton's third law.			
a.	Identify pairs of forces (e.g., action-reaction, equal and opposite) acting between two objects (e.g., two electric charges, a book and the table it rests upon, a person and a rope being pulled).			
b.	Determine the magnitude and direction of the acting force when magnitude and direction of the reacting force is known.			
c.	Provide the magnitude and direction of the acting force when magnitude and direction of the reacting force is known.			
d.	Relate the historical development of Newton's laws of motion to our current understanding of the nature of science (e.g., based upon previous knowledge, empirical evidence, replicable observations, development of scientific law).			

STANDARD III: Students will understand the factors determining strength of gravitational and electric forces.

Percentage of coverage in the *student and teacher edition* for Standard III:_____ %	Percentage of coverage not in student or teacher edition, but covered in the *ancillary material* for Standard III: _____%

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Objective 3.1: Relate the strength of the gravitational force to the distance between two objects and the mass of objects (i.e., Newton's law of universal gravitation).			
a. Investigate how mass affects the gravitational force (e.g., spring scale, balance, or other method of finding a relationship between mass and the gravitational force).			
b. Distinguish between mass and weight.			

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c.	Describe how distance between objects affects the gravitational force (e.g., effect of gravitational forces of the moon and sun on objects on Earth).			
d.	Explain how evidence and inference are used to describe fundamental forces in nature, such as the gravitational force.			
e.	Research the importance of gravitational forces in the space program.			
Objective 3.2: Describe the factors that affect the electric force (i.e., Coulomb's law).				
a.	Relate the types of charge to their effect on electric force (i.e., like charges repel, unlike charges attract).			
b.	Describe how the amount of charge affects the electric force.			
c.	Investigate the relationship of distance between charged objects and the strength of the electric force.			
d.	Research and report on electric forces in everyday applications found in both nature and technology (e.g., lightning, living organisms, batteries, copy machine, electrostatic precipitators).			

STANDARD IV: Students will understand transfer and conservation of energy.

Percentage of coverage in the *student and teacher edition* for Standard IV:_____ %	Percentage of coverage not in student or teacher edition, but covered in the *ancillary material* for Standard IV: _____%

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Objective 4.1: Determine kinetic and potential energy in a system.				
a.	Identify various types of potential energy (i.e., gravitational, elastic, chemical, electrostatic, nuclear).			
b.	Calculate the kinetic energy of an object given the velocity and mass of the object.			
c.	Describe the types of energy contributing to the total energy of a given system.			
Objective 4.2: Describe the conservation of energy in terms of				

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		systems.		
a.	Describe a closed system in terms of its total energy.			
b.	Relate the transformations between kinetic and potential energy in a system (e.g., moving magnet induces electricity in a coil of wire, roller coaster, internal combustion engine).			
c.	Gather data and calculate the gravitational potential energy and the kinetic energy of an object (e.g., pendulum, water flowing downhill, ball dropped from a height) and relate this to the conservation of energy of a system.			
d.	Evaluate social, economic, and environmental issues related to the production and transmission of electrical energy.			
Objective 4.3: Describe common energy transformations and the effect on availability of energy.				
a.	Describe the loss of useful energy in energy transformations.			
b.	Investigate the transfer of heat energy by conduction, convection, and radiation.			
c.	Describe the transformation of mechanical energy into electrical energy and the transmission of electrical energy.			
d.	Research and report on the transformation of energy in electrical generation plants (e.g., chemical to heat to electricity, nuclear to heat to mechanical to electrical, gravitational to kinetic to mechanical to electrical), and include energy losses during each transformation.			

STANDARD V: Students will understand the properties and application of waves.

Percentage of coverage in the *student and teacher edition* for Standard V:_____ %	**Percentage of coverage not in student or teacher edition, but covered in the *ancillary material* for Standard V: _____%**	

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Objective 5.1: Demonstrate an understanding of mechanical waves in terms of general wave properties.			

a.	Differentiate between period, frequency, wavelength, and amplitude of waves.			
b.	Investigate and compare reflection, refraction, and diffraction of waves.			
c.	Provide examples of waves commonly observed in nature and/or used in technological applications.			
d.	Identify the relationship between the speed, wavelength, and frequency of a wave.			
e.	Explain the observed change in frequency of a mechanical wave coming from a moving object as is approaches and moves away (i.e., Doppler effect).			
f.	Explain the transfer of energy through a medium by mechanical waves.			
Objective 5.2: Describe the nature of electromagnetic radiation and visible light.				
a.	Describe the relationship of energy to wavelength or frequency for electromagnetic radiation.			
b.	Distinguish between the different parts of the electro-magnetic spectrum (e.g., radio waves and x-rays or visible light and microwaves).			
c.	Explain that the different parts of the electromagnetic spectrum all travel through empty space and at the same speed.			
d.	Explain the observed change in frequency of an electro-magnetic wave coming from a moving object as it approaches and moves away (i.e., Doppler effect, red/blue shift).			
e.	Provide examples of the use of electromagnetic radiation in everyday life (e.g., communications, lasers, microwaves, cellular phones, satellite, dishes, visible light).			